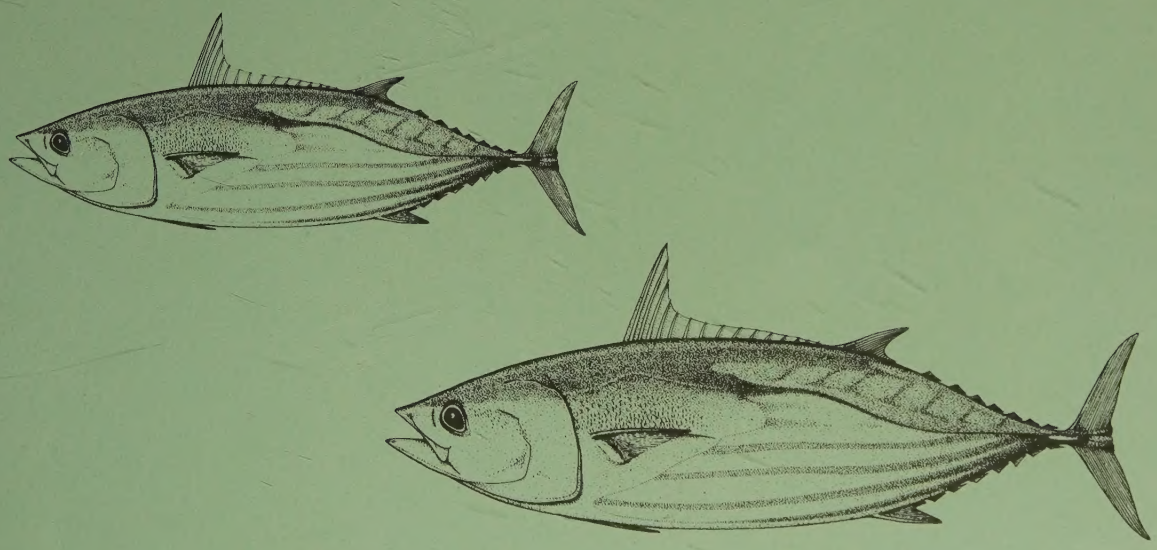
April 1974
No. 4

FISHING INFORMATION

Southwest Fisheries Center-La Jolla, California



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U.S. DEPARTMENT OF COMMERCE
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SOUTHWEST FISHERIES CENTER
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FISHING INFORMATION

APRIL 1974, No. 4

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PREFACE

This publication, Fishing Information, appears monthly and contains 1) fishery advisory information, 2) a narrative description of pertinent surface temperature conditions, 3) a narrative description of subsurface temperature structure for parts of the North Pacific, 4) charts of winds and pressures for the eastern North Pacific, 5) charts of sea surface temperature for the North Pacific and eastern tropical Pacific, and 6) charts of subsurface temperature structure in the eastern North Pacific.

A supplement to Fishing Information appears at 15-day intervals throughout the year. This is a chart of sea surface temperature (contoured at 2°F (1°C) intervals) from Baja California to Vancouver Island out to about 135°W. Special bulletins are published in conjunction with the 15-day sea surface temperature charts which include short-term projections of albacore distribution and locations of productive fishing areas, information on oceanographic and atmospheric conditions, and other information as is appropriate during the albacore fishing season.

L.E. Eber, Leader
Fishery Information Systems
Southwest Fisheries Center
La Jolla, California

Submitted for publication - May 20, 1974

CONTENTS

PAGE

Acknowledgements iv

Sea Surface Temperature and Environmental Conditions - April 1974, L. Eber and F. Miller 1

Subsurface Temperature Structure in the Northeast Pacific Ocean, J.F.T. Saur 3

ENVIRONMENTAL CHARTS, PACIFIC OCEAN - April 1974

Figure 1. Fourteen-year mean (1961-74) observed sea level values of barometric pressure (millibars), resultant wind direction (degrees true), resultant wind speed (knots) and average wind speed (knots) regardless of direction 4

Figure 2. Observed sea level values of barometric pressure (millibars), resultant wind direction (degrees true), resultant wind speed (knots) and average wind speed (knots) regardless of direction 5

Figure 3. Mean sea surface temperature, eastern North Pacific Ocean. Squares show temperatures at weathership stations. Numerals on shore are temperatures at coastal and lightship stations 6

Figure 4. Mean sea surface temperature chart, western North Pacific Ocean 7

Figure 5. Deviation of sea surface temperatures, eastern North Pacific Ocean from 20-year mean (1948-67). Hatched areas are colder in 1974 8

Figure 6. Deviation of sea surface temperatures, western North Pacific Ocean from 20-year mean (1948-67). Hatched areas are colder in 1974 9

Figure 7. Deviation of sea surface temperatures, eastern North Pacific Ocean from those of April 1973. Hatched areas are colder in 1974 10

Figure 8. Deviation of long-term chart H.O. 225 from new base period 1948-67 (20-year mean). Shaded areas indicate 20-year mean colder than H.O. 225 11

Figure 9. Mean sea surface temperatures, eastern tropical Pacific Ocean. Numerals on shore are temperatures at coastal stations 12

Figure 10. Deviation of sea surface temperatures, eastern tropical Pacific Ocean from 20-year mean (1948-67). Shaded areas are colder in 1974. Contours are dashed in sparse data areas 13

Figure 11. Surface temperature and salinity and subsurface temperature structure from expendable bathythermograph observations between Honolulu and San Francisco: March 16-20, 1974 14

Figure 12. Surface temperature and salinity and subsurface temperature structure from expendable bathythermograph observations between Honolulu and San Francisco: April 5-10, 1974 15

ENVIRONMENTAL CHARTS ANALYZED BY:
L. Eber (Figures 4 and 6), F. Miller (Figures 9 and 10)
J. Renner (Figures 1, 2, 3, 5, 7, and 8), J.F.T. Saur (Figures 11 and 12)

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National Marine Fisheries Service, La Jolla, California: Honolulu, Hawaii
National Weather Service, San Diego, California
National Ocean Survey, Pacific Marine Center, Seattle, Washington
Pacific Environment Institute, Fisheries Research Board of Canada, West Vancouver, British Columbia, by L. F. Giovando from observations by S. G. Westhaver at Langara Island Light; D. L. Kupillas at Cape St. James Light; J. Coldwell at Kains Island Lightstation; O. A. Edwards at Amphitrite Point Light
Scripps Institution of Oceanography, La Jolla, California.
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Expendable bathythermograph and salinity observations are made by the mates and engineers of the S.S. Hawaiian Enterprise of Matson Navigation Co. The data are processed under supervision of D.R. McLain at the NMFS Pacific Environmental Group, Monterey, using computer facilities of the Fleet Numerical Weather Center. The project is partially supported by the National Science Foundation and the Office of Naval Research under Government Order NAonr-9-74.

Sea Surface Temperature and Environmental Conditions

L. EBER AND F. MILLER

Eastern North Pacific

The onset of seasonal warming was reflected in higher surface water temperatures over most of the eastern north Pacific in April 1974. The warming was sufficient to reduce slightly the negative deviations off southeast Alaska, British Columbia and the U.S. West Coast. The ocean surface layers west of 120°W, between 25° and 30°N, also warmed more than normal and temperature deviations in this zone became predominately positive (Figure 5).

In the region west of 150°W and north of 30°N, however, sea temperatures did not increase at the normal rate and in some portions actually decreased from corresponding values observed the previous month. As a result, the temperature deviations in this region have become mostly negative.

Atmospheric sea level pressure was about normal, or a little above, south of 35°N and east of 135°W but below normal in the northwest sector of the eastern north Pacific (Figures 1 and 2). Negative deviations of pressure reached 10 millibars over the outer Aleutians. This created a strong north-south pressure gradient at mid-latitudes, west of 150°W, which caused intensification of westerly winds in this area. These, in turn, probably were the principal factor affecting the anomalous temperature decreases noted previously, since strong winds increase heat loss by evaporation and also cause greater vertical mixing of surface water with cooler water below.

Western North Pacific

Sea surface temperatures in the western north Pacific revealed below normal increases from April to May 1974, north of 35°N and the positive deviations which had prevailed in that region were reduced or became negative (Figure 6). Conditions south of 35°N continued to be generally cooler than normal. Negative deviations exceeded 2°F (1.1°C) in a few scattered patches but the overall anomaly pattern was weak.

Eastern Tropical Pacific

From March to April of each year the eastern tropical Pacific experiences seasonal cooling in the surface layer south of the equator. Temperatures in the Peru Current decreased as much as 3°F (1.7°C) from Chile to Ecuador. In the equatorial area (5°N to 5°S) temperatures usually warm slightly west of 120°W and cool to the east. North of the equator temperature changes are small from March to April except in a narrow band from 7°N to 12°N to the east of 100°W. Here temperatures usually increased 2°F(1.1°C) as a result of light winds and considerable solar heating under fairly clear skies.

In April 1974, temperature patterns (Figure 9) reflected seasonal cooling in the southern hemisphere and warming north of the equator. Synoptic ship reports have been sparse along the coast of South America and coastal station temperatures have not been available since August 1973. Therefore, accurate descriptions of temperatures and anomalies (Figure 10) are not possible. Based on scattered ship temperatures, fishing vessel reports and meteorological factors, temperatures in the Peru Current appear to remain slightly below the long term mean.

In the equatorial area warming occurred from the equator to 5°N between 80°W and 90°W. Around the Line Islands (150°-160°W) the cold anomalies shown in figure 10 were associated with persistently strong trades of 15-20 knots.

In the fishing grounds west and south of Baja California, there is a pattern of negative anomalies which have become weaker during the past 2 months. Temperatures in this area for the past several months have been consistently colder than a year ago.

Good tuna fishing from Central America to 110°W along 10° N, in March and April 1974, has been associated with a tongue of relatively cold tropical water. Negative anomalies of 2° to 4°F (1.1° to 2.2°C) over this area have been caused by upwelling around the Costa Rica dome (10°N, 88°W) and by vertical mixing due to strong surface winds from the coast westward to Clipperton Island.

Subsurface Temperature Structure in the Northeast Pacific Ocean

J.F.T. Saur

Since the March issue of Fishing Information observations have been received for four sections of subsurface temperatures between San Francisco and Hawaii from two round trips of the S.S. Hawaiian Enterprise. Figure 11 presents the earliest section, March 16-20, 1974, from the outbound leg of Voyage 86, and Figure 12 presents the latest section, April 5-10, 1974, from the inbound leg of Voyage 87. No transits were made on the Los Angeles-Hawaii route.

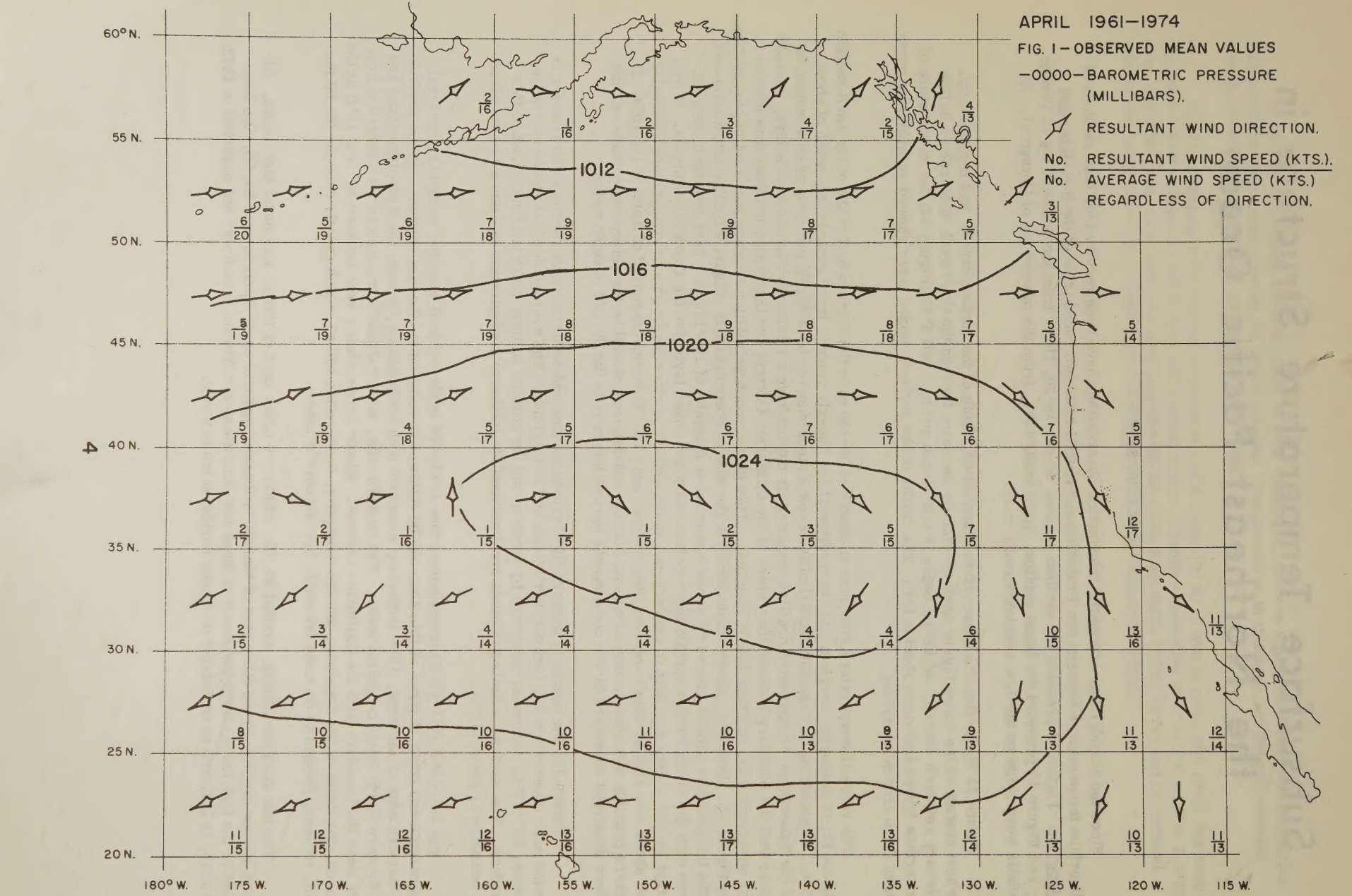
Figure 11 shows that the temperature distribution, depth of the surface layer, and consequently, the heat content of the upper layers were essentially the same through the third week of March as in late February and early March. Warming began in late March and by April 5-10 (Figure 12) the temperature of the surface layers had risen about 0.5°C. The depths of the surface, mixed layer showed considerable variability from station to station.

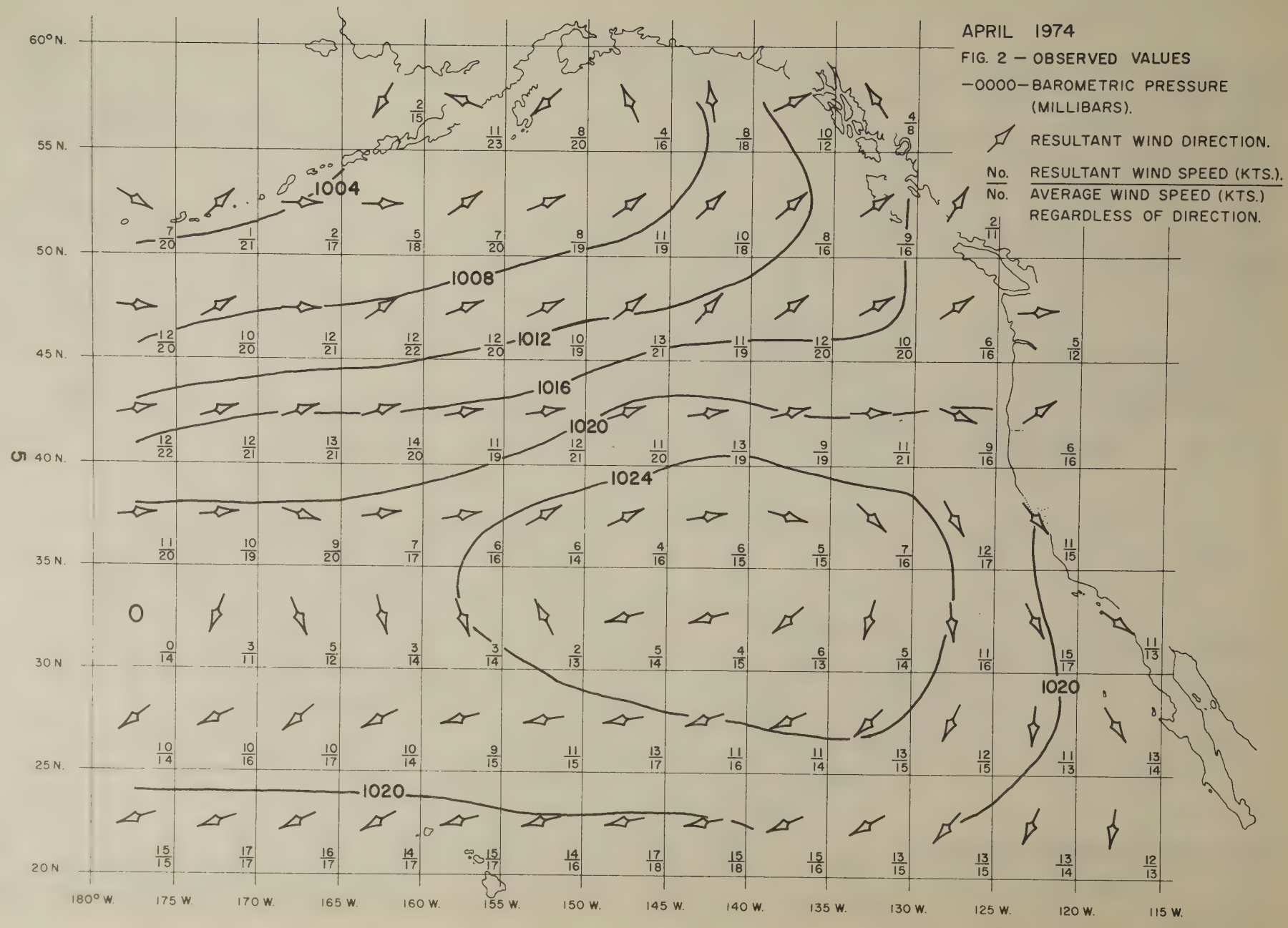
The vertical temperature structure at depths of 90-130 m in the eastern half of the early April section (Figure 12) is unusually complex. At observation 21 the "nearly-mixed" layer extends to a depth of about 150 m. Considering that the surface salinities show a steep rise to above 33.7‰ just west of observation 21 and the subsurface temperature profiles immediately beyond have a minimum-maximum structure, it would appear that the boundary between the waters of the California Current and the Transition Zone was located near observation 21, at about 133°W longitude. This corresponds well with a location just west of observation 6 in Figure 11. However, observations 22-24 to the east of observation 21 (Figure 12) also have a minimum in the temperature profile around 90 m and a maximum at depths of 120-125 m. This structure does not agree with the criterion of a simple thermocline below the mixed layer for the California Current. It may be that we are seeing an effect of convergence in the oceanic surface layer, due to anticyclonic (clockwise) wind shear revealed by ship's weather observations near 132°W during the period of April 3-10, 1974. It appears possible that observation 21 was in oceanic convergence caused by the anticyclonic winds and the waters displaced downward by the convergence spread laterally in the 90-120 m depth range.

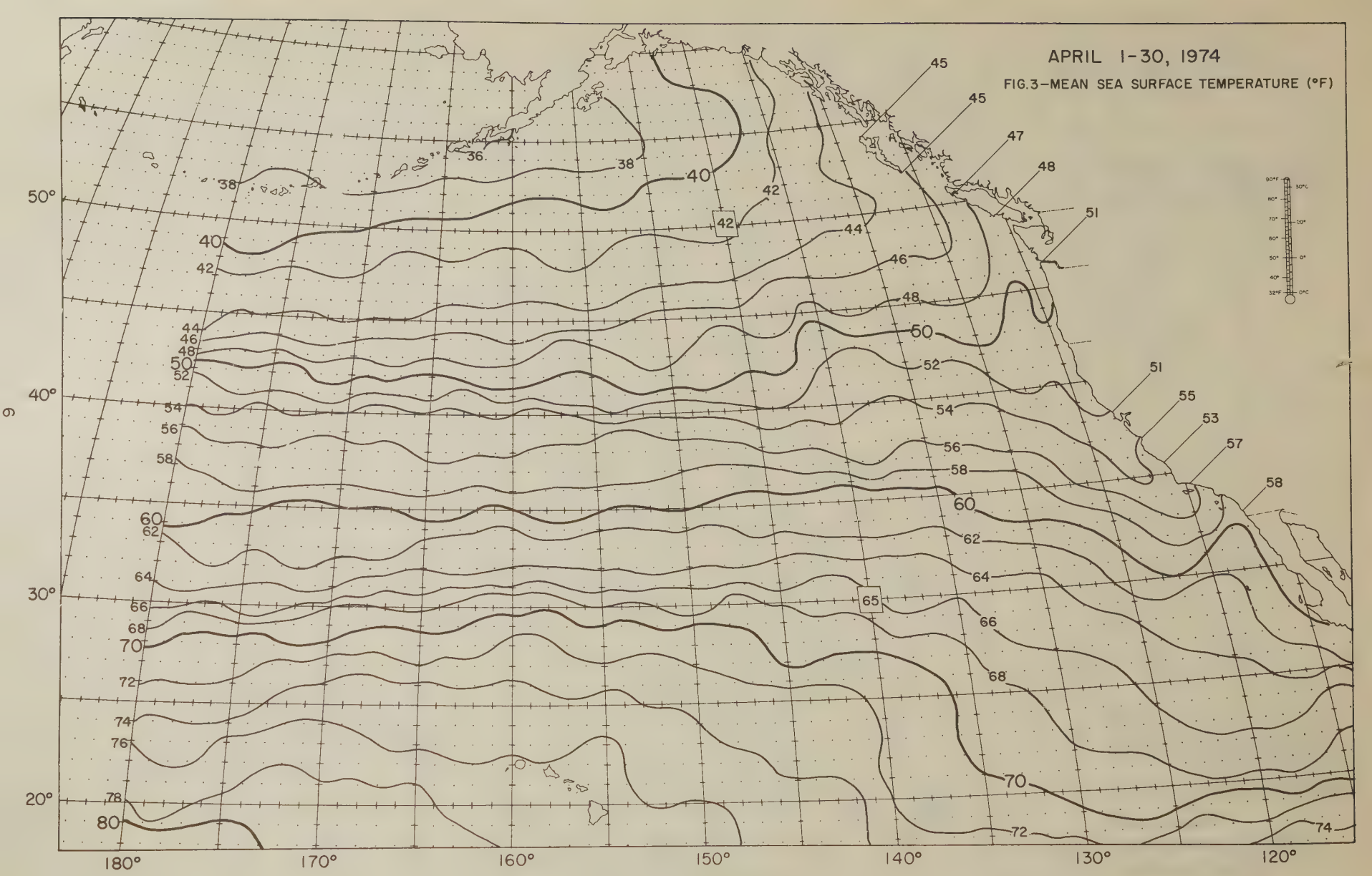
In Figure 12, the boundary between the Transition Zone and Eastern North Pacific Central water is located near observation 12, between 143°W and 144°W longitude. The average depth of intermediate isotherms, 13°-15°C, increases westward by 50-60 m and the surface salinity rises to above 35.0‰ at this boundary. The surface salinity gradients and intermediate isotherm configuration in Figure 11 also place the boundary at about 143°W.

The 16°-19°C (61°-66°F) temperature zone is shaded in the vertical sections so that the seasonal progression and depth changes of this zone can be followed in relation to albacore catches. At the surface the western edge of the zone, 19°C isotherm, coincided with the boundary between the Transition Zone and the Eastern North Pacific Central water. The eastern edge, the 16°C isotherm, was in the Transition Zone, quite near the boundary with the California Current. Where temperatures were between 16° and 19°C at the surface, the depth of the zone was, for the most part, deeper than 100 m, which greatly exceeds the 60 m limit, or less, thought to be most favorable for albacore catches.

The low surface salinity, around 34.5‰, within 200 miles east of Hawaii was noted last month. Although it rose slightly in the later part of March, it dropped again in early April to near 34.5‰. As mentioned in the last issue, the appearance of these low salinities near Hawaii, which was not observed in 1972 and 1973, is believed to be related to strong northeast trade winds.

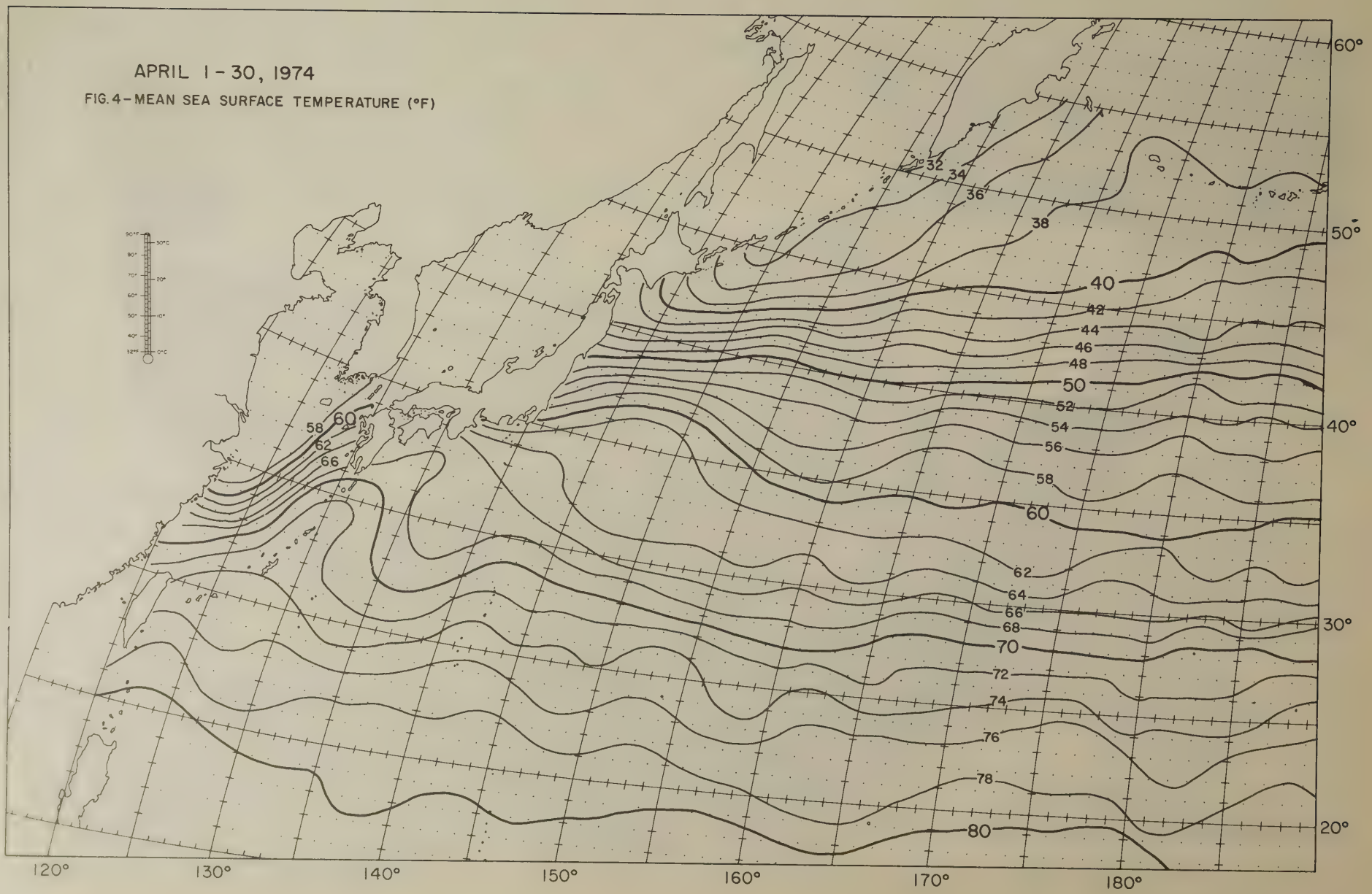

APRIL 1961–1974
FIG. 1 – OBSERVED MEAN VALUES
–0000– BAROMETRIC PRESSURE (MILLIBARS).
RESULTANT WIND DIRECTION.
No. RESULTANT WIND SPEED (KTS.).
No. AVERAGE WIND SPEED (KTS.) REGARDLESS OF DIRECTION.
1012
1016
1020
1024
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N.
25 N.
20 N.
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.

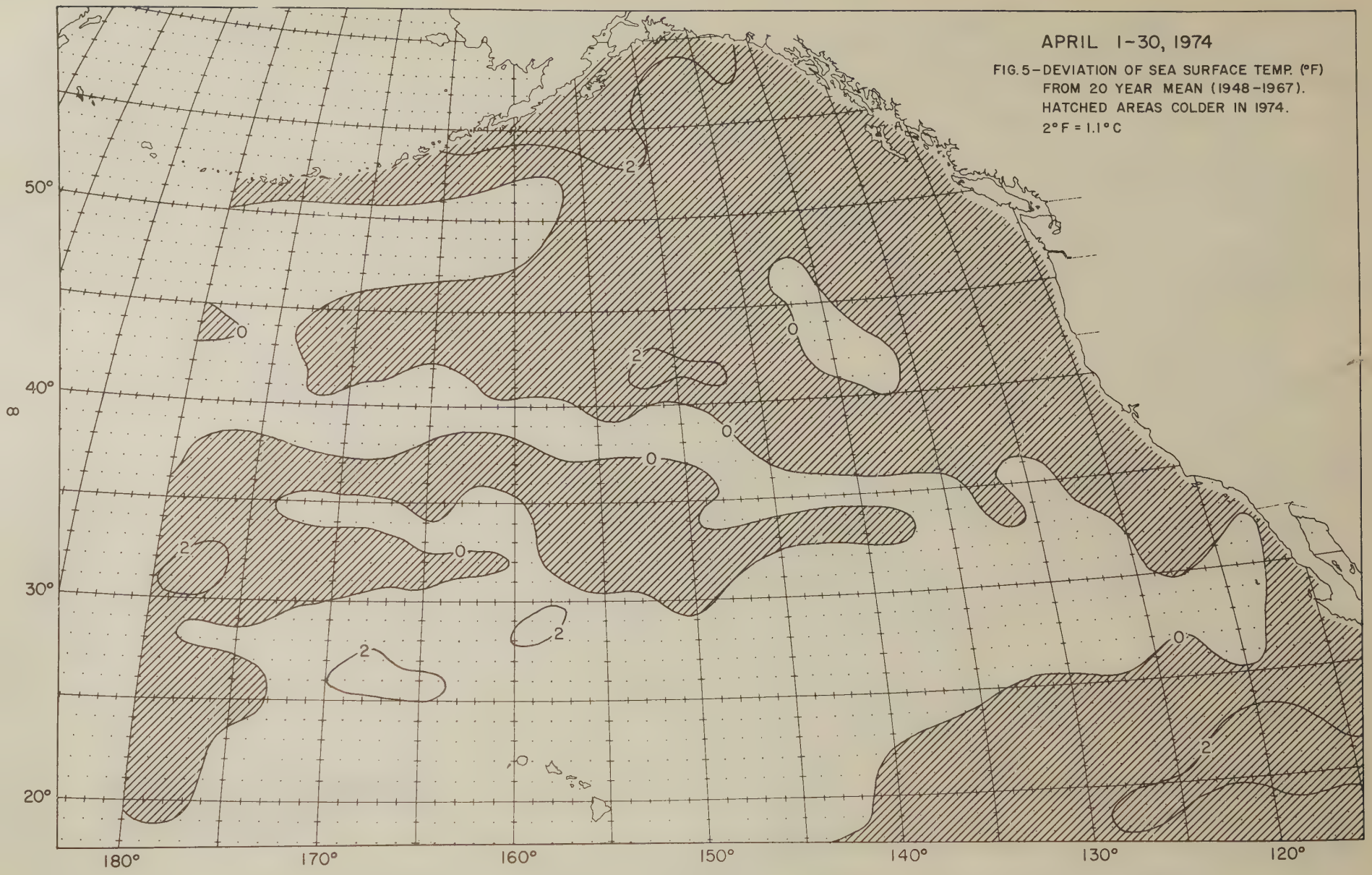

APRIL 1974
FIG. 2 — OBSERVED VALUES
—0000— BAROMETRIC PRESSURE (MILLIBARS).
RESULTANT WIND DIRECTION.
No. RESULTANT WIND SPEED (KTS.).
No. AVERAGE WIND SPEED (KTS.) REGARDLESS OF DIRECTION.
60° N.
55 N.
50 N.
45 N.
40 N.
35 N.
30 N
25 N.
20 N
180° W.
175 W.
170 W.
165 W.
160 W.
155 W.
150 W.
145 W.
140 W.
135 W.
130 W.
125 W.
120 W.
115 W.
1004
1008
1012
1016
1020
1024
1020
1020

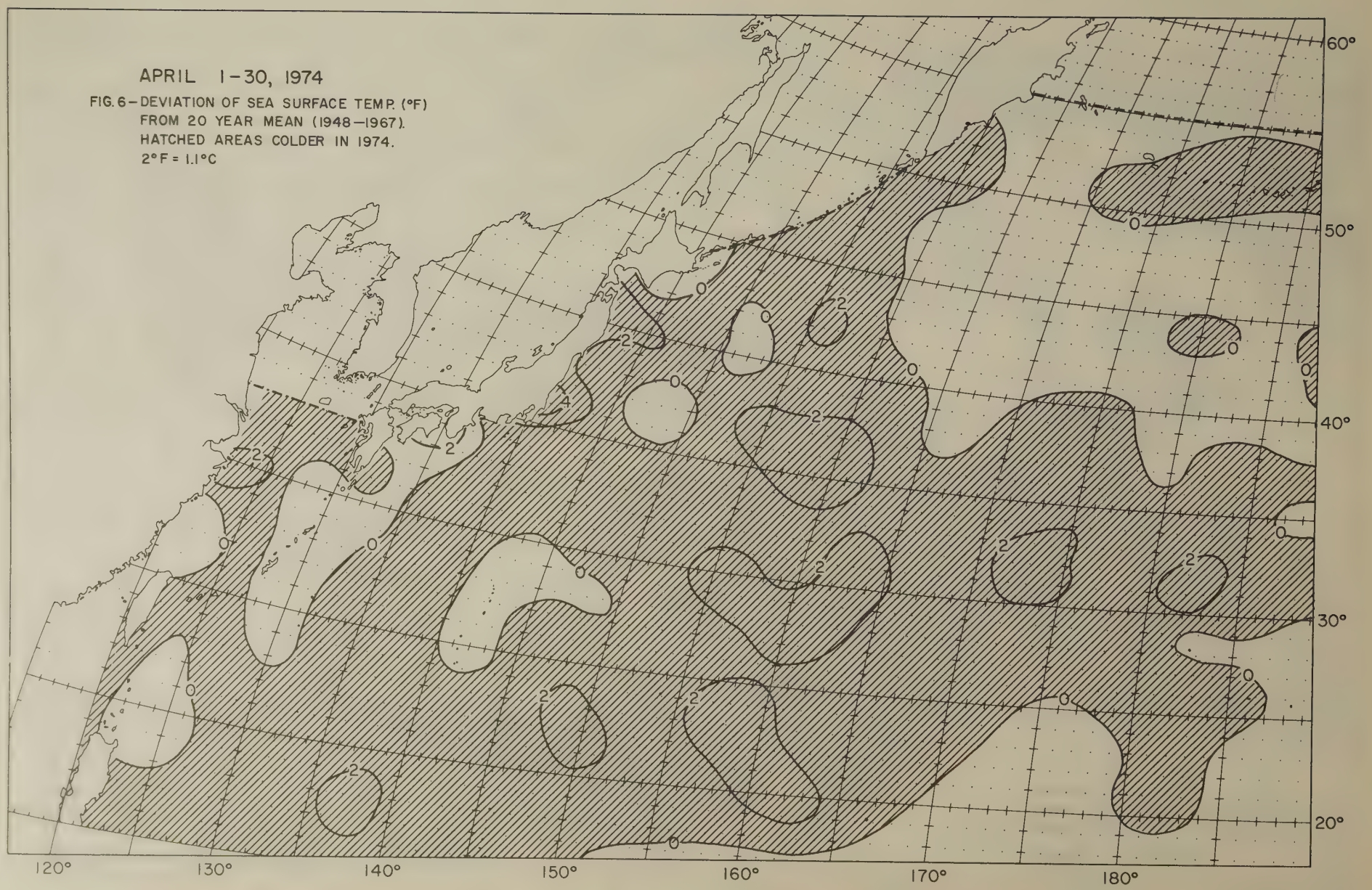

APRIL 1-30, 1974
FIG.3-MEAN SEA SURFACE TEMPERATURE (°F)
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°

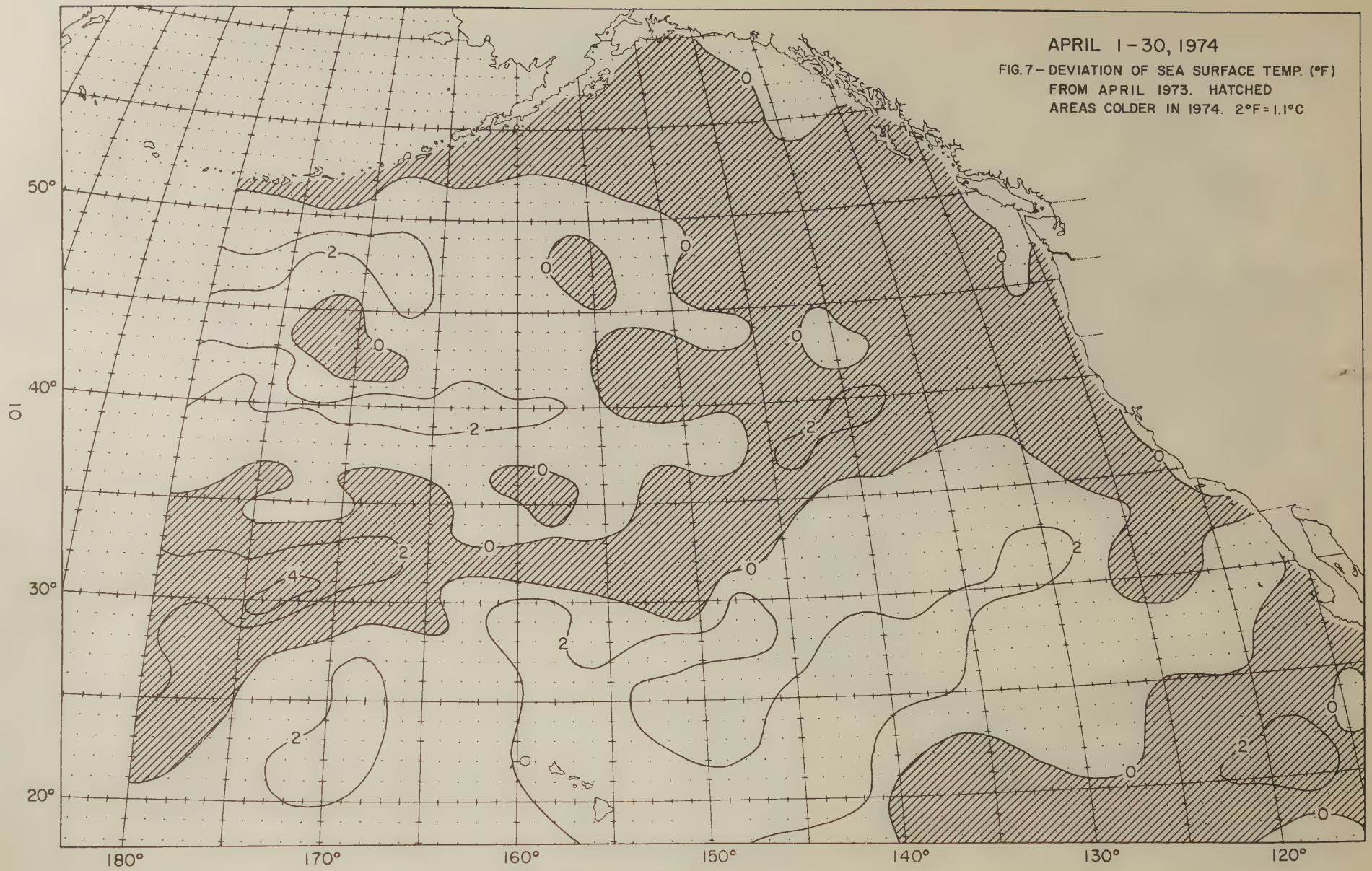
APRIL 1 - 30, 1974

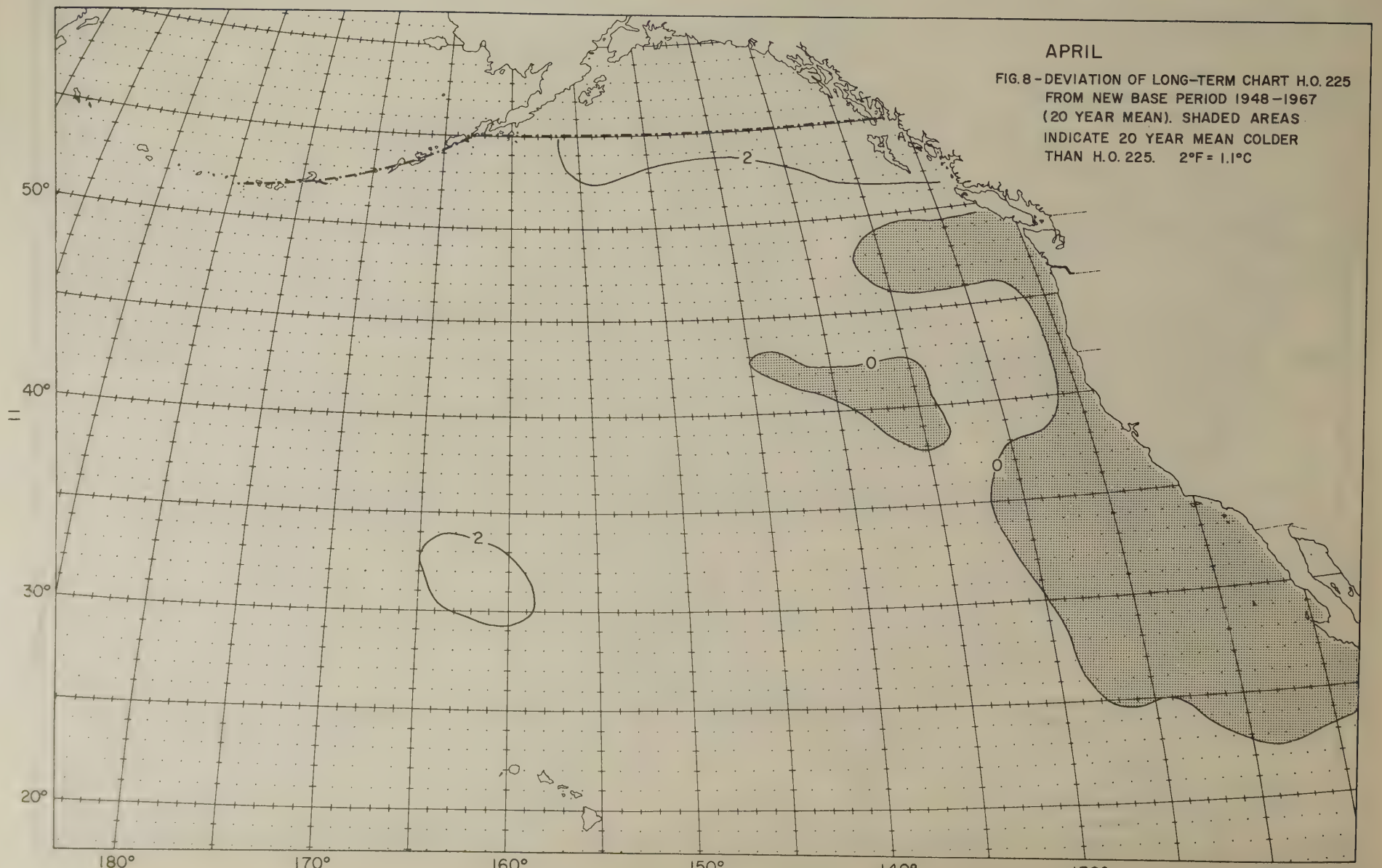
FIG. 4 - MEAN SEA SURFACE TEMPERATURE (°F)

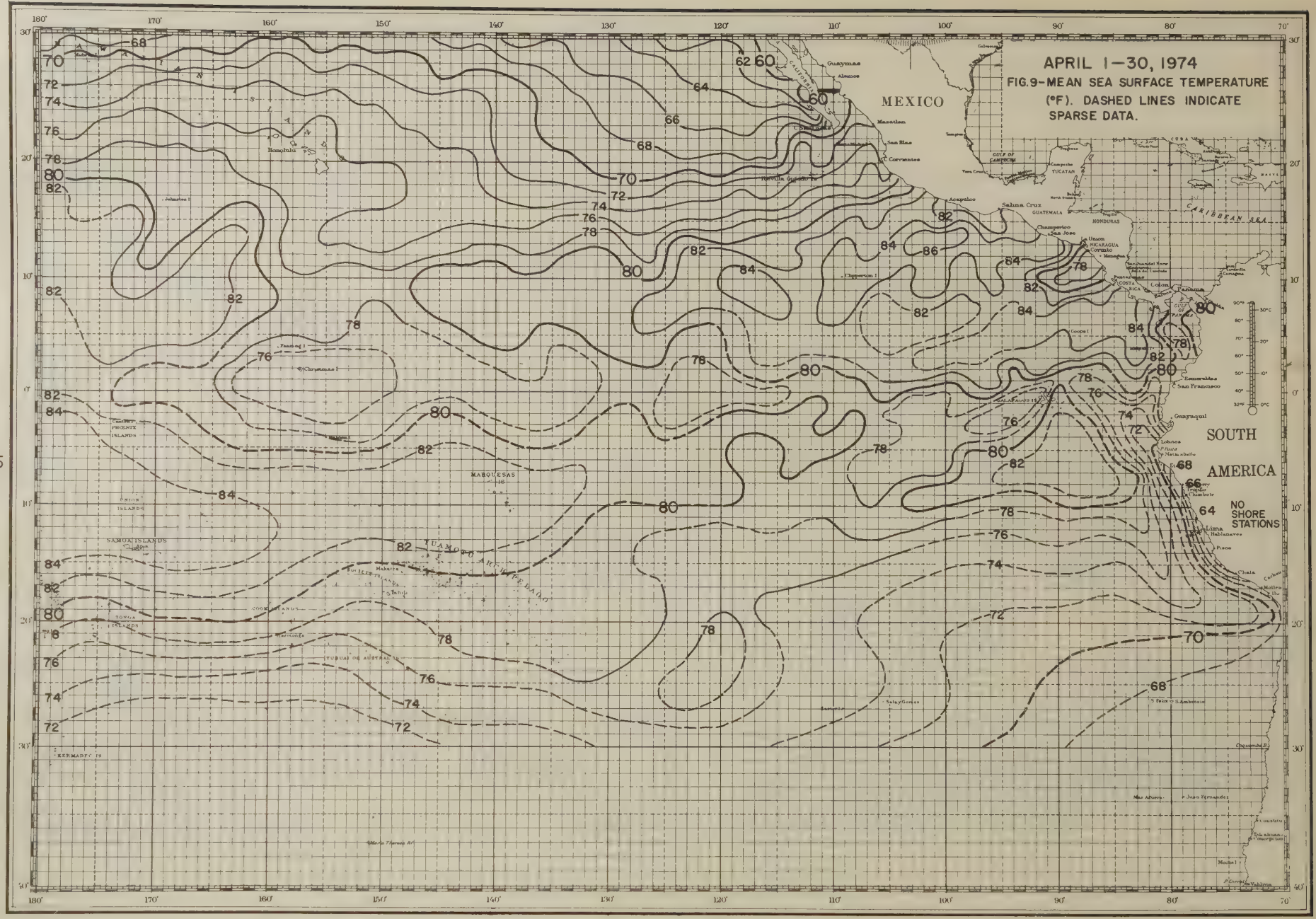



APRIL 1-30, 1974
FIG. 5-DEVIATION OF SEA SURFACE TEMP. (°F) FROM 20 YEAR MEAN (1948-1967). HATCHED AREAS COLDER IN 1974. 2° F = 1.1° C
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°
2
0
2
0
0
2
0
2
2
0
0
2


APRIL 1-30, 1974
FIG. 6 - DEVIATION OF SEA SURFACE TEMP. (°F) FROM 20 YEAR MEAN (1948-1967). HATCHED AREAS COLDER IN 1974.
2°F = 1.1°C
60°
50°
40°
30°
20°
120°
130°
140°
150°
160°
170°
180°
0
2
4


APRIL 1-30, 1974
FIG. 7 - DEVIATION OF SEA SURFACE TEMP. (°F) FROM APRIL 1973. HATCHED AREAS COLDER IN 1974. 2°F = 1.1°C
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°
0
2
4


APRIL
FIG. 8 - DEVIATION OF LONG-TERM CHART H.O. 225 FROM NEW BASE PERIOD 1948-1967 (20 YEAR MEAN). SHADED AREAS INDICATE 20 YEAR MEAN COLDER THAN H.O. 225. 2°F = 1.1°C
50°
40°
30°
20°
180°
170°
160°
150°
140°
130°
120°
2
2
0
0
0


APRIL 1—30, 1974
FIG.9-MEAN SEA SURFACE TEMPERATURE (°F). DASHED LINES INDICATE SPARSE DATA.
MEXICO
SOUTH AMERICA
NO SHORE STATIONS
CARIBBEAN SEA
GUATEMALA
HONDURAS
NICARAGUA
COSTA RICA
Guaymas
Mazatlan
San Blas
Corrientes
Acapulco
Salina Cruz
Champerico
San Jose
Corinto
Panama
Colon
Guayaquil
Lima
Callao
Pisco
Chala
Honolulu
MARQUESAS
SAMOA ISLANDS
TUAMOTU ARCHIPELAGO
TUBUAI OR AUSTRAL IS.
COOK IS.
TONGA ISLANDS
PHOENIX ISLANDS
LINE ISLANDS
KERMADEC IS.
GALAPAGOS IS.
Juan Fernandez
Easter I.
Salay Gomez

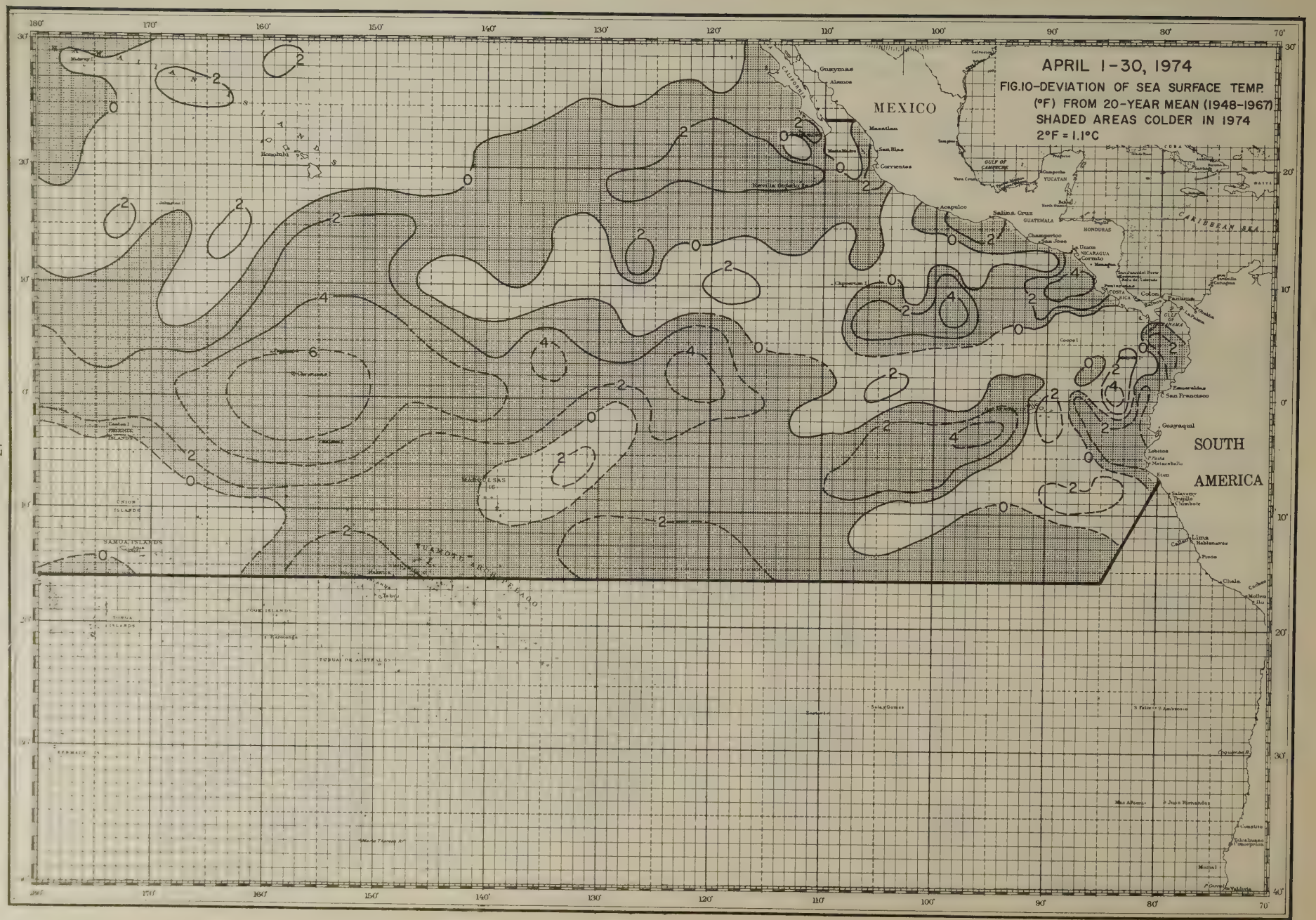
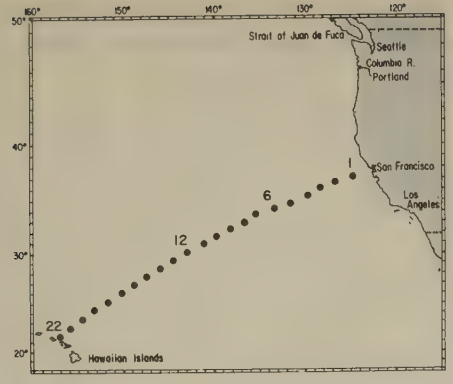
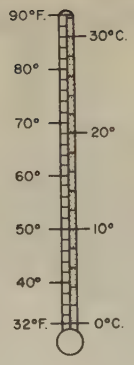

APRIL 1-30, 1974
FIG.10-DEVIATION OF SEA SURFACE TEMP. (°F) FROM 20-YEAR MEAN (1948-1967)
SHADED AREAS COLDER IN 1974
2°F = 1.1°C
MEXICO
SOUTH AMERICA
CARIBBEAN SEA
GUATEMALA
HONDURAS
NICARAGUA
COSTA RICA
PANAMA
CUBA
HAITI
GULF OF CALIFORNIA
GULF OF PANAMA
Guaymas
Mazatlan
San Blas
Corrientes
Acapulco
Salina Cruz
Champerico
Corinto
Colon
Esmeraldas
San Francisco
Guayaquil
Salaverry
Trujillo
Chimbote
Lima
Callao
Pisco
Chala
Mollendo
Ilo
Iquique
Arica
Antofagasta
Caldera
Coquimbo
Valparaiso
Talcahuano
Concepcion
Mocha I.
Juan Fernandez
Mas Afuera
Mas Tierra
Easter I.
Sala y Gomez
San Felix
San Ambrosio
Galapagos Is.
Cocos I.
Malpelo I.
Gorgona I.
Gorgona
Buenaventura
Tumaco
Esmeraldas
Manta
Salinas
Puna I.
Guayaquil
Tumbes
Paita
Lobitos
Talara
Eten
Pacasmayo
Salaverry
Trujillo
Chimbote
Huacho
Callao
Lima

FIGURE 11





HONOLULU – SAN FRANCISCO

MARCH 16–20, 1974

SS HAWAIIAN ENTERPRISE

VOYAGE 86

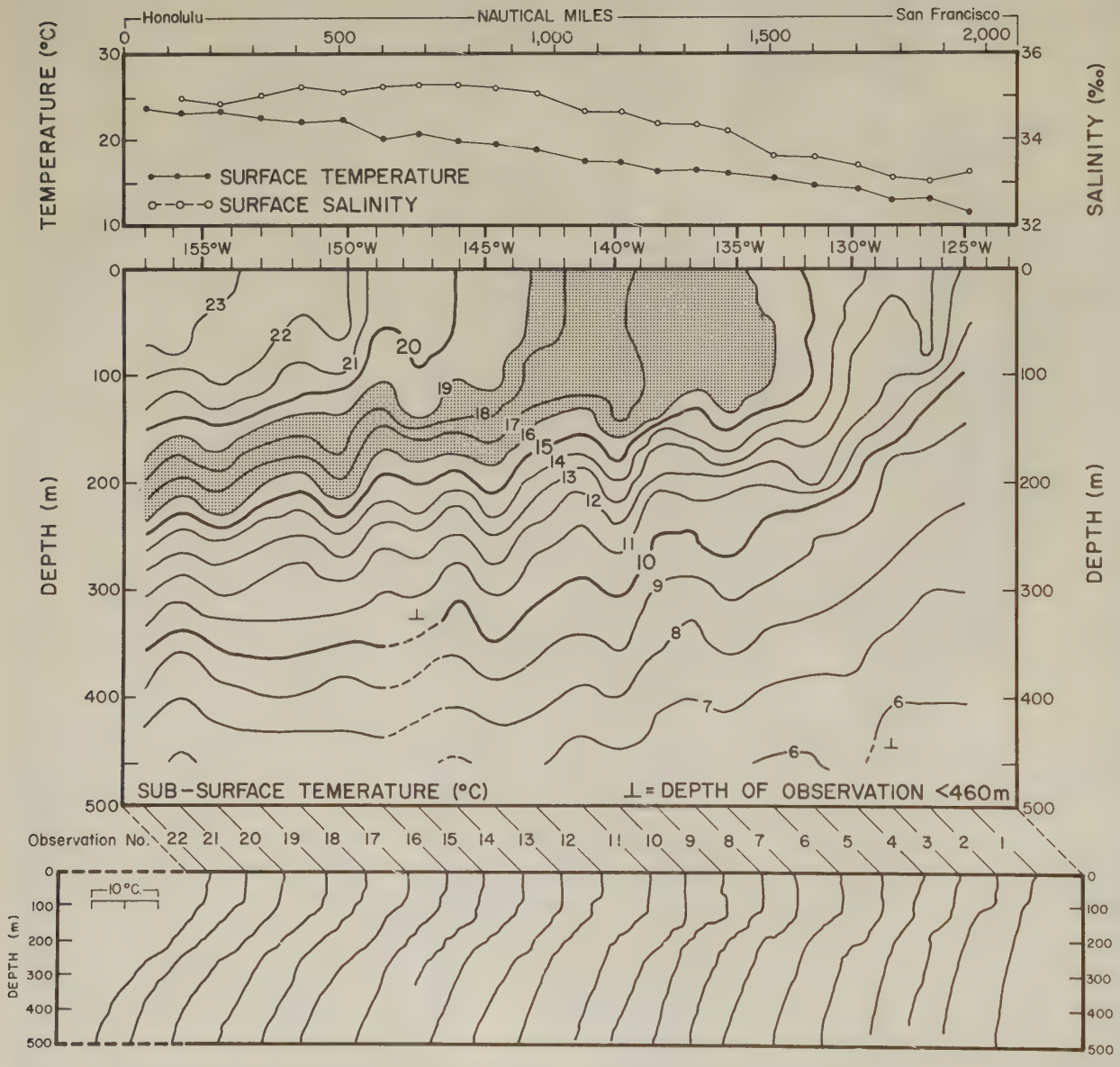
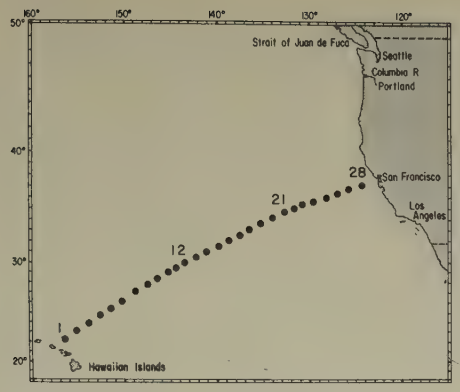
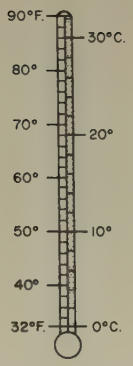


FIGURE 12



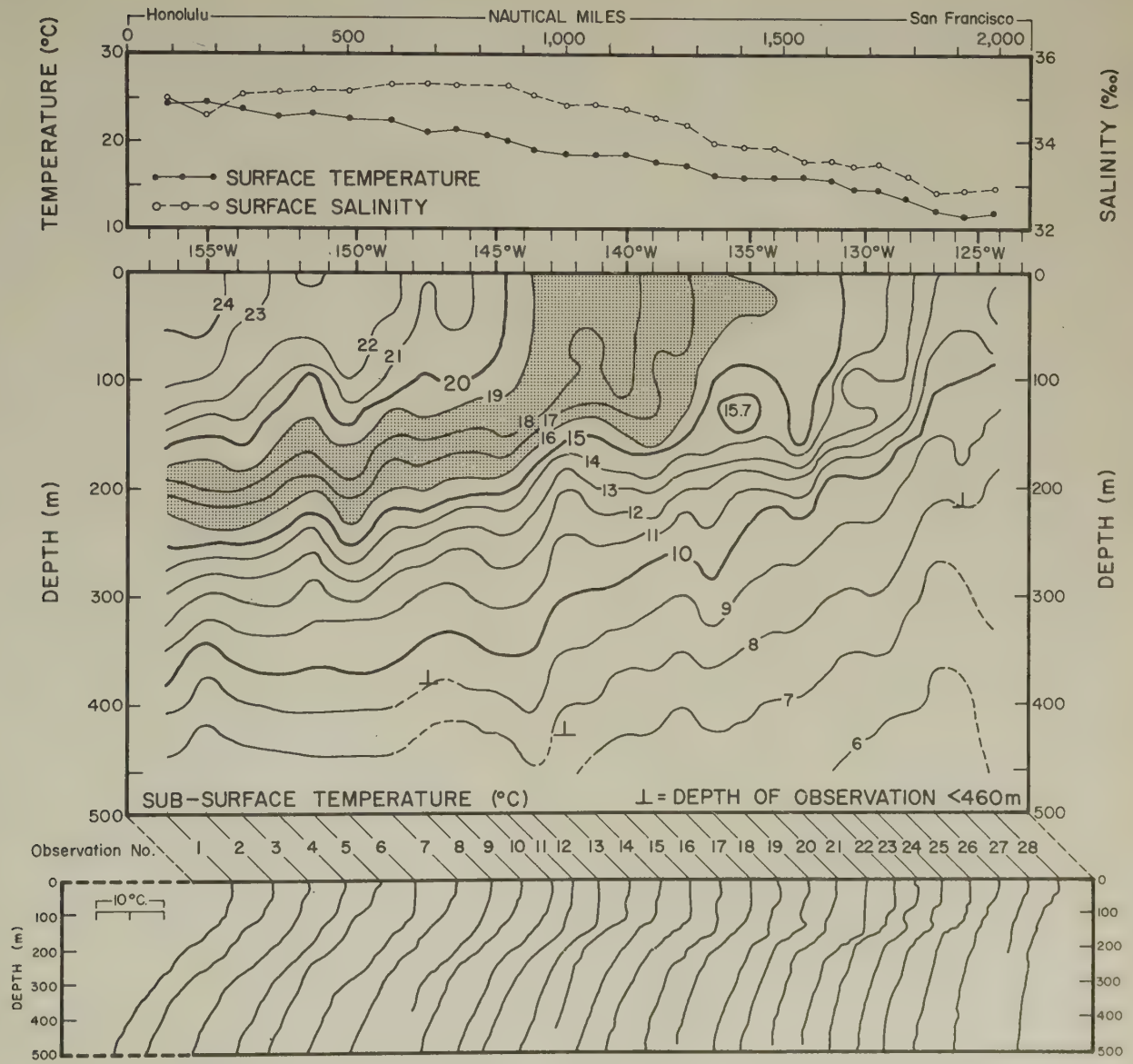


HONOLULU – SAN FRANCISCO

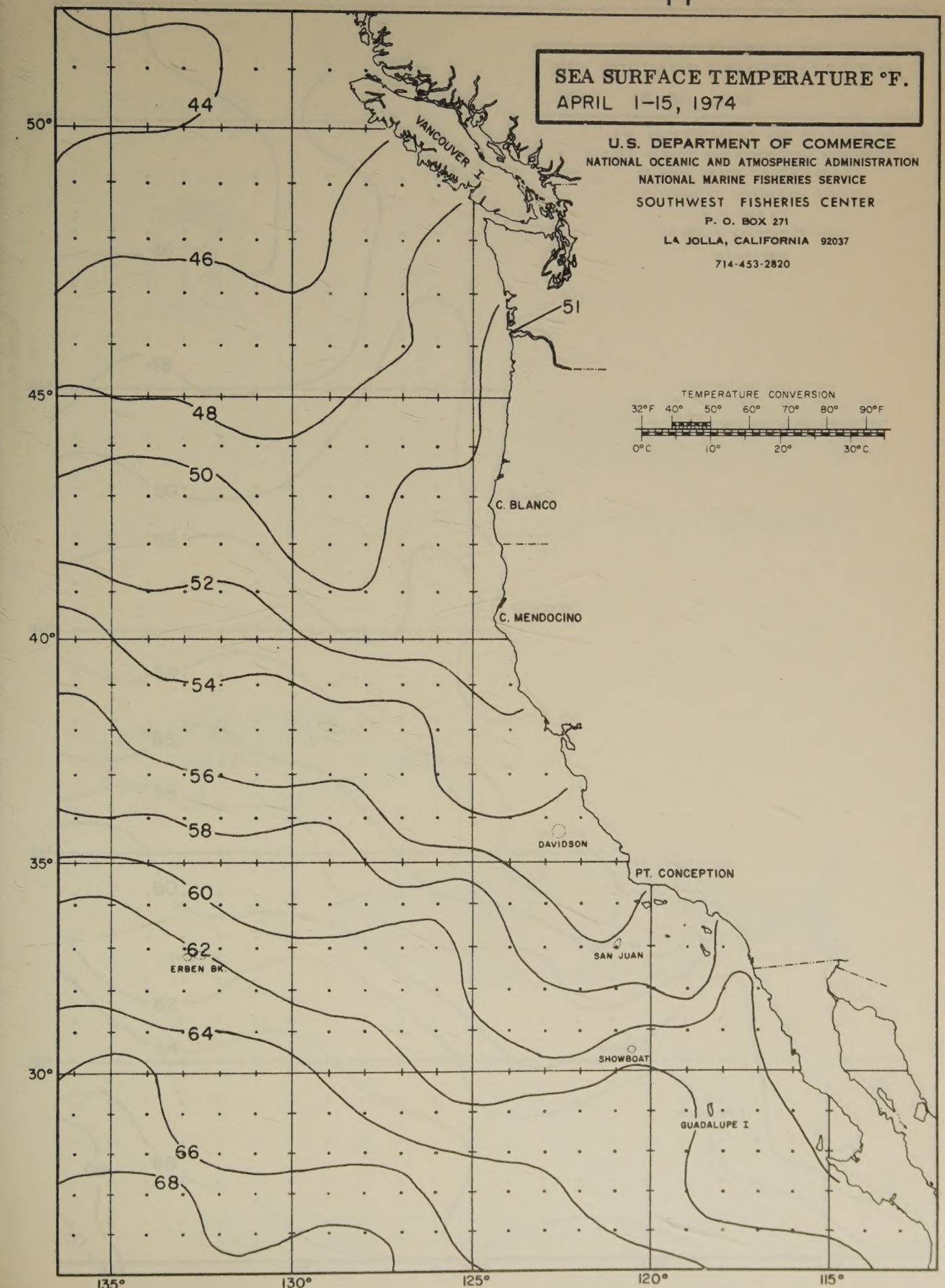
APRIL 5-10, 1974

SS HAWAIIAN ENTERPRISE

VOYAGE 87



FISHING INFORMATION – supplement



FISHING INFORMATION – supplement